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CIRCUIT DESCRIPTION
SWITCHING SYSTEMS DEVELOPMENT DEPARTMENT

CD-95031-01
Issue 5-D
Appendix 1-D
Dwg. Issue 13-D

COMMON SYSTEMS
TRUNK COIN CONTROL CIRCUIT FOR USE WITH TOLL CONNECTING TRUNKS IN MANUAL OR DIAL OFFICES

CHANGES

B. CHANGES IN APPARATUS

B1

Superseded	Superseded By
B310 Relay	B36 Relay
149-CN Relay	149-CE Relay

D. DESCRIPTION OF CIRCUIT CHANGES

D.1 The use of relays B310 and 149-CN is rated "Mfr. Disc." to show realisitc ratings for obsolescent apparatus.

D.2 Relays B36, B310, 149-CE and 149-CN are added to note 108.

D.3 In figs. 1 and 3, "CO" and "CC" leads are interchanged to show them matching those of figs. 2, A, B, and C to improve the clarity of the drawing.

All other headings, no change.

BELL TELEPHONE LABORATORIES, INC.

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SYSTEMS DEVELOPMENT DEPARTMENT

CD-95031-01
Issue 5-D
Dwg. Iss. 12-D

COMMON SYSTEMS
TRUNK COIN CONTROL CIRCUIT FOR USE WITH TOLL CONNECTING TRUNKS IN MANUAL OR DIAL OFFICES

CHANGES

B. CHANGES IN APPARATUS

B.1 Added

1 - 18AN Resistance - Fig. 1
1 - B310 Relay - Fig. 3
1 - 19BF Resistance - Fig. 3
1 - 2MF Condenser - Fig. 3
1 - 266D Relay - Fig. 3
1 - 18AR Resistance - Fig. 3
1 - U735 Relay - Fig. 4
1 - 1MF Condenser - Fig. 4
1 - .01MF Condenser - "W" option - Fig. 4

B.2

Superseded	Superseded By
206FB Relay - Fig. 1	280AA Relay - Fig. 1

C. CHANGES IN CIRCUIT REQUIREMENTS OTHER THAN THOSE APPLYING TO ADDED OR REMOVED APPARATUS

C.1 "BLOCK (CP) NO" was formerly specified for relays (CC) and (CR) in Fig. 1.

D. DESCRIPTION OF CIRCUIT CHANGES

D.01 Optional designations assigned and shown at the (CC) and (CR) relays in Fig. 1.

D.02 The use of the 206FB relay is manufacture discontinued and is superseded by the 280AA relay to provide a polarized relay with improved adjustment stability.

D.03 The (D) resistance is added in Fig. 1 to provide adequate margins for a relay in the connecting circuit when short loops and other adverse conditions, such as adjustment and coin battery voltage, are encountered.

D.04 Notes 112, 113, 114 and 115 are added.

D.05 Figs. 1, D and E are rated "Mfr. Disc." and replaced by Figs. 3 and 4 to provide a more economical arrangement.

D.06 The use of Figs. 3 and 4 and options "Q", "P", "N", "R", "S", "J" and "H" added to Note 108.

D.07 Figs. 3 and 4 and options "Q", "P" "N", "R", "S", "M", "K" and "J" and "H" added to "Options Used" table.

D.08 Note 103 changed to include reference to relay (TN).

D.09 The "Working Limits" table is changed.

D.10 In Notes 101 and 102 "1/2 AMP HV" was "1/2 AMP".

D.11 Cross-connections changed.

D.12 Reference to relay (TN) added in Note 103.

D.13 Note 106 was clarified. It formerly read as follows:

Type of Toll Connecting Trunk Circuit	Potential Between Ground At Coin Box and Ground Connected to Coin Battery Supply	
	Less than ± 8V	Greater than ± 8V
Toll Connecting trunk which is equipped with a slow release rel. wired in series with lead "CO" or "RO"	Fig. A and "X" wiring Fig. 55	Fig. B and "Y" wiring Fig. 55
Toll connecting trunk which is not equipped with a slow release rel. wired in series with lead "CO" or "RO"	Fig. B and "Y" wiring Fig. 55	Fig. C and "Z" wiring Fig. 55

D.14 Optional designations assigned and shown at the 8E, 12L and 13L lamps in Fig. 1.

All other headings under Changes, No change.

1. PURPOSE OF CIRCUIT

1.1 This circuit is for use with the panel, step-by-step, manual or crossbar office end of a two-wire toll connecting trunk arranged for connection to a coin box subscribers line.

The operation of this circuit controls the collection or return of coins deposited in the coin box which is connected to the associated toll connecting trunk. The operation of this circuit is controlled by the toll or manual operator and the control signals are originated in the toll or manual switchboard. With Fig. 1 or 3 the control signals are transmitted to this circuit over a separate lead. In panel central offices where toll and panel central offices are in the same or adjacent buildings, the control signals are received from the trunk control circuit in the toll office directly by the toll incoming selector coin control equipment which is shown on this circuit as Fig. 2, and Figs. 1, 3, A, B and C are omitted.

2. WORKING LIMITS

2.1 Relay (CP)

Maximum external subscriber circuit loop resistance 1500 ohms; minimum insulation resistance 10,000 ohms; earth potential ± 20 volts, coin battery supply 100-120 volts or 125-135 volts in series with resistance lamp 8E, 12L or 13L.

2.2 Relay (EL), (CC), (CR) and (C)

Maximum external circuit resistance to coin battery in series with 8E, 12L or 13L lamp in parallel with a 38,500 ohm or 27,000 ohm circuit to ground at distant office; minimum trunk conductor insulation resistance 30,000 ohms and earth potential ± 20 volts.

(1) Relay (EL)

8560 ohms - coin battery 116-120V
6000 ohms - coin battery 100-120V

(2) Relay (CC) or (CR)

7175 ohms - coin battery 116-120V
4860 ohms - coin battery 100-120V

(3) Relay (C)

7816 ohms - coin battery 116-120V
4776 ohms - coin battery 100-120V
9476 ohms - coin battery 125-135V

3. FUNCTIONS

Figure 1 or 3

3.1 Provides ground for operating a relay in the associated toll connecting trunk. The operation of this relay completes a circuit for the application of coin control voltage to the subscribers line via leads "CC" or "CR".

3.2 Connects coin collect voltage to the subscribers line via lead "CC" or "CR", when a coin collect signal is received over lead "CC" or "T".

3.3 Connects coin return voltage to the subscribers line via lead "CC" or "CR" when a coin return signal is received over lead "CC" or "T".

3.4 Provides a signal to the operator if a coin is in the box when the coin control battery is connected to the subscribers line. This signal is a high-low resistance signal and is sent back over lead "CC" or "T" where it controls a coin pilot lamp.

3.5 When the coin control battery is disconnected from the subscribers line, sufficient time is provided before the talking circuit is again closed through to the subscribers line to insure the release of the coin magnet.

3.6 Provides a surge absorption circuit which will absorb the discharge of the coin magnet in the subscribers line during the open interval following the disconnection of the coin battery and before reconnection of the talking battery.

Figure 2

3.7 Provides a circuit arrangement which will permit the omission of Fig. 1 or 3 with panel incoming selectors when the panel and the toll central offices are located in the same or adjacent buildings.

3.8 Provides the coin control relay and wiring for the panel toll incoming selector.

Figure E or 4

3.9 Provides means for sending a low tone signal to the toll operator when the coin collect feature is operated or a high tone signal when the coin return feature is operated.

4. CONNECTING CIRCUITS

4.01 Toll Switchboard No. 3, 3C or 3CL Trunk Coin Control Circuit - SD-64424-01.

4.02 Toll Switchboard No. 3, 3C or 3CL Straightforward Toll Switching Trunk Circuit - SD-55224-01 via SD-64424-01.

4.03 Toll Switchboard No. 3, 3C or 3CL Toll Switching Trunk Circuit SD-55346-01 via SD-64424-01.

4.04 Subscriber's Recording Completing Trunk - SD-64571-01 via SD-64424-01.

4.05 Switchboard 13C, 13D, 15C or 15D Outgoing Trunk - SD-25423-01.

4.06 Switchboard 1, 1C, 1D, 10 or 11 Outgoing Trunk from Toll Switching Position - SD-15126-01.

4.07 Toll Switchboard No. 3C or 3CL Outgoing Trunk Circuit - SD-55879-01.

4.08 Toll Switchboard No. 1 Coin Control Cord Circuit - SD-60537-01, SD-55218-01.

4.09 Crossbar No. 1 Incoming Trunk Circuit - SD-25302-01.

4.10 Step-by-Step Toll Transmission Selector - SD-31522-01.

4.11 Panel Operators Recording Completing Trunk Circuit - SD-21823-02.

4.12 Transfer Trunk Circuit - SD-55897-01.

4.13 Operator Recording Completing Trunk - SD-56090-01.

4.14 LD Incoming Selector - Panel - SD-21504-02.

4.15 Crossbar No. 1 Subscriber Recording Completing Trunk Circuit SD-25218-01.

4.16 Miscellaneous Alarm Circuit (Key circuit) - 355A SXS System - SD-31974-01.

4.17 Tone Supply Circuits in Manual or SXS Offices.

4.18 SXS Incoming Trunk Circuit From Toll Switchboard - SD-31703-01.

DESCRIPTION OF OPERATION

5. FIGURE 1

The application of coin potential to the "CC" or "T" lead operates the (~~CC~~) C ~~or (CR~~) relay depending upon the polarity of the impressed voltage. ~~The (CC) relay operates if the polarity is positive and the (CR) relay operates if it is negative. The (EL) relay operates regardless of the polarity of the battery~~. The operation of relay ~~(CC) or (CR)~~ C connects coin potential of the proper polarity through the winding of relay (CP) to lead "CC". ~~The operation of relay (EL) connects~~ ground to lead "CO", which eventually causes the operation of the (CN) relay in Fig. 2 via Fig. B or Fig. C or an equivalent relay in a toll connecting circuit of a different type which is arranged for coin control. The operation of this relay short-circuits the tip and ring of the subscribers line and connects lead "CC" from Fig. 1 to the subscriber line. If there is a coin in the coin box at the station at this time relay (CP) will operate and remain operated as long as the coin control key at the switchboard is operated. The operation of relay (CP) short-circuits resistances (A) and (C) causing the coin pilot lamp at the switchboard to be lighted. When the coin key is released, relay (CP) will release and the coin pilot lamp at the switchboard is extinguished. The release of the coin key also releases relays (CC) or (CR) and (EL). The release of relay (EL) will in turn cause the release of relay (CN) Fig. 2 or the equivalent relay in the connected toll connecting circuit. If the coin key is reoperated, relay (CP) will reoperate if the coin has not been disposed of but will not reoperate if the coin has been disposed of. The release of the coin key again will cause the relays of this circuit to release as described for the first operation.

NOTE: The (B) condenser and the (B) resistance which are connected in series to ground and to lead "CG" - Fig. 1 - serve as a discharge path for the energy stored in the coin magnet when the coin key is released.

6. FIGURES A, B AND C

The coin magnet is apt to be sluggish in releasing and unless a time delay is introduced between the disconnection of coin potential and the reconnection of the 48 volt talking battery to the line, the magnet might fail to release and hold to the 48 volt talking battery when it is reconnected. The releasing time of the magnet varies directly with the magnitude of an aiding earth potential. For all types of toll connecting circuits arranged for coin control in local panel or step-by-step offices either Fig. A, Fig. B or Fig. C shall be used with Fig. 1 or 3.

Fig. A is used when the earth potential between ground at the coin box and ground connected to the coin battery supply is 8 volts or less and the toll connecting trunk is equipped with a slow release relay which will give the time delay discussed above.

Fig. B is used when the earth potential between ground at the coin box and ground connected to the coin battery supply is 8 volts or less and the toll connecting trunk is not equipped with a slow release relay. It is also used with toll connecting trunks which have a slow release relay but the earth potential exceeds 8 volts. The (TM) relay operates when relay (EL) operates. The operation of relay (TM) operates the (CN) relay in Fig. 2 or an equivalent relay in a toll connecting trunk which when operated causes the subscribers line to be short-circuited and connected to lead "CC" or "CR" of Fig. B.

Fig. C is used where the earth potential between ground at the coin box and ground connected to the coin battery supply exceeds 8 volts and the trunk circuit is not equipped with a slow release relay. Relay (TM) operates when relay (EL) operates. The operation of relay (TM) operates relay (TM1) which in turn operates the (CN) relay, Fig. 2, or an equivalent relay in a toll connecting trunk which short-circuits the subscribers line and connects it to lead "CC" or "CR" of Fig. C.

The release of relay (EL) releases relay (TM), Fig. B or (TM) and (TM1) Fig. C which in turn releases relay (CN) of Fig. 2 or the equivalent relay in the toll connecting trunk thereby restoring the circuits to normal.

7. FIGURE 2

When the toll and local offices are in the same or adjacent buildings Fig. 1 or 3 with Fig. A, B, or C is not required and the coin control connection to the toll connecting trunk in the local panel or step-by-step office is made directly from the trunk coin control circuit in the toll office to the toll connecting trunk in the local office. However, in the case of a toll incoming selector in a panel office the coin control equipment associated with the toll connecting trunk is not shown on the toll incoming selector drawing. Therefore, this equipment is shown on this circuit as Fig. 2. The operation of relay (CN) is described in paragraph 5 and 6.

8. FIGURE E

Figure E is provided for sending tones to the toll operator during the operation of the coin control features. When the coin collect feature is operated relay (CC) of Fig. 1 is operated thereby connecting the coin collect battery through the winding of relay (LT) to the subscribers line. If there is a coin in the box, relay (LT) will operate and connect a low tone signal to lead "CT" which in turn transmits the low tone signal over the toll connecting trunk to the distant toll operator. If the coin return feature is operated relay (CR) of Fig. 1 is operated and coin return battery through the winding of relay (HT) is connected to the subscribers line. If there is a coin in the box, relay (HT) will operate and connect the high tone signal to lead "CT" which in turn sends the high tone signal over the toll connecting trunk to the distant toll operator. These tone signals serve to indicate to the distant toll operator that the coin feature is operated.

9. FIGURES 3 AND 4

9.1 Relay (C) is a 266 type relay which consists of two "R" type relays joined together in a single magnetic circuit.

9.2 The "R" type relay marked P+ on the drawing operates when + coin battery is connected to lead "CC" or "T". This closes contacts 1T, 4T and 2B to 2T, 3T and 1B, respectively.

9.3 The "R" type relay marked P- on the drawing operates when - coin battery is connected to lead "CC" or "T". This closes contacts 5T, 7T and 3B to 6T, 8T and 4B, respectively.

9.4 Relay (C) operated on the P+ side, connects ground to lead "CO" and coin collect battery through lamp (CC) and relay (CP) to lead "CC". If Fig. 4 is provided, it also connects low tone to a contact of relay (TN).

9.5 Relay (C) operated on the P- side, connects ground to lead "CO" and coin return battery through lamp (CR) and relay (CP) to lead "CC". If Fig. 4 is provided, it also connects high tone to a contact of relay (TN).

9.6 The connection of ground to lead "CO" causes the circuit to function as covered in Par. 5.

9.7 If there is a coin in the coin box at the station at the time relay (C) operates, relay (CP) operates and remains operated as long as coin battery is connected to lead "CC" or "T". The operation of relay (CP), with "M" option, short-circuits the two secondary windings of relay (C) causing the coin pilot lamp at the switchboard to light. With "K" option, relay (CP) operates relay (TN) which functions as covered in Par. 9.8. When the coin key is released, relay (C) releases and the coin pilot lamp is extinguished. Relay (C) released, removes ground from lead "CO" and coin battery from lead "CC" releasing relay (CP). If the coin key is reoperated, relay (C) reoperates. If the coin has not been disposed of, relay (CP) will reoperate but will not if it has been disposed of.

NOTE: The (B) condenser and (B) resistance which are connected to ground and to lead "CC serve as a discharge path for the energy stored in the coin magnet when the coin key is released.

9.8 If "K" option and Fig. 4 are provided, the operation of relay (CP) in Fig. 3 operates relay (TN) of Fig. 4. Relay (TN) operated short-circuits the secondary windings of relay (C) causing the circuit to function as described in Par. 9.7. Relay (TN) operated also connects low or high tone (depending whether the P+ or P- side of relay (C) is operated) to lead "CT" thereby sending tone to the distant toll operator as covered in Par. 8. When relay (CP) releases, it releases relay (TN) which removes the short-circuit from the secondary windings of relay (C) causing the circuit to function as covered in Par. 9.7. Relay (TN) released, also removes the tone.

10. RESISTANCE (D)

This resistance is in the circuit when the trunk conductor resistance is less than 350 ohms, to prevent releasing a high resistance relay connected to ground at the switchboard end of the trunk conductor, when relay (CP) operates.

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